

## CLAIMS

1. A twin-clutch manual gearbox for an engine, the gearbox including:

5 a first input shaft (5) and a second input shaft (6) to which engine rotation is selectively input via individual clutches (C1, C2), the second input shaft (6) being rotatably fitted onto the first input shaft (5) so that the first input shaft (5) protrudes from a rearward end of the second input shaft (6) farthest from the  
10 engine,

first gearsets (G1, G3, G5, GR) associated with a first gearbox speed grouping, said first gearsets (G1, G3, G5, GR) being located between the rearward end of the protruding first input shaft (5) and a layshaft (15) located substantially  
15 parallel to the first and second input shafts (5, 6) such that appropriate transmission is enabled for respective ones of the first gearsets (G1, G3, G5, GR),

second gearsets (G2, G4, G6) associated with a second gearbox speed grouping, the second gearsets (G2, G4, G6) being located between the second input shaft  
20 (6) and the layshaft (15) such that appropriate transmission is enabled for respective ones of the second gearsets (G2, G4, G6), whereby rotation according to a selected gear after a gearchange is output in an axial direction from a rearward end (5a) of the first input shaft (5) or of the layshaft (15),

25 the twin-clutch manual gearbox being characterized in that the second gearsets (G2, G4, G6) are positioned such that the gearset (G4) associated with the lowest gearbox speed of the second gearbox speed grouping capable of providing a bearing retaining space between the first input shaft (5) and the second input shaft

(6) is positioned so as to be farthest from the engine, and the gearset (G6) associated with the highest gearbox speed of the remaining gearbox speeds of the second gearbox speed grouping is positioned so as to be closest to the engine.

5 2. The twin-clutch manual gearbox as claimed in Claim 1, wherein the second input shaft (6) is hollow for receiving a forward end of the first input shaft (5), thereby to define the bearing retaining space therebetween for housing a bearing (7, 8) for a gearset of the second gearbox speed grouping.

10 3. The twin-clutch manual gearbox as claimed in Claim 1 or Claim 2, wherein the second gearbox speed grouping includes a further gearset (G2) associated with a gearbox speed intermediate said lowest and highest gearbox speeds, and wherein the further gearset (G2) is positioned intermediate the gearset (G4) associated with said lowest gearbox speed and the gearset (G6)  
15 associated with said highest gearbox speed.

4. The twin-clutch manual gearbox as claimed in any one of Claims 1 to 3, wherein the second gearsets associated with the remaining gearbox speeds of the second gearbox speed grouping are further positioned in accordance with the  
20 following criteria: (i) between a gearset (G4) associated with a gearbox speed positioned farthest from the engine and a gearset (G6) associated with a gearbox speed positioned closest to the engine and (ii) in such a manner that gearsets associated with higher gearbox speeds are positioned closer to the engine.

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5. The twin-clutch manual gearbox as claimed in any one of Claims 1 to 4, in which the gearsets (G2, G4, G6) of the second gearbox speed grouping provided

between said second input shaft (6) and the layshaft (15) form an even-numbered gearbox speed grouping.

6. The twin-clutch manual gearbox as claimed in Claim 5, wherein a fourth  
5 gear gearset (G4) is positioned farthest from the engine.

7. The twin-clutch manual gearbox as claimed in Claim 6, wherein a sixth  
gear gearset (G6) is positioned closest to the engine and a second gear gearset  
(G2) is positioned intermediate the fourth and sixth gear gearsets (G4, G6).

8. The twin-clutch manual gearbox as claimed in any one of Claims 1 to 7,  
wherein the first gearsets of the first gearbox speed grouping form an odd-  
numbered gearbox speed grouping.

9. The twin-clutch manual gearbox as claimed in any one of Claims 1 to 8,  
wherein the first and second shafts (5, 6) and the layshaft (15) constitute a shaft  
arrangement, the twin-clutch manual gearbox further comprising at least one  
interlocking mechanism (37, 38) for enabling, respectively, appropriate  
transmission of gearsets associated with the second gearbox speed grouping.

10. The twin-clutch manual gearbox as claimed in Claim 9, comprising a  
plurality of interlocking mechanisms (37, 38) for enabling, respectively,  
appropriate transmission of gearsets associated with the second gearbox speed  
grouping, wherein the plurality of interlocking mechanisms (37, 38) is provided  
25 between the second input shaft (6) and said layshaft (15) on a layshaft side of the  
shaft arrangement (5, 6, 15).

11. The twin-clutch manual gearbox as claimed in Claim 10, wherein one of the interlocking mechanisms is a specialized interlocking mechanism (37) for enabling appropriate transmission of the gearset (G6) positioned closest to the engine, and wherein the specialised interlocking mechanism (37) is positioned  
5 between the gearset (G6) positioned closest to the engine and a gearset (G2) positioned adjacent to said gearset (G6).

12. The twin-clutch manual gearbox as claimed in Claim 11, wherein the second gearsets associated with the second gearbox speed grouping form a  
10 grouping of a second gear gearset (G2), a fourth gear gearset (G4) and a sixth gear gearset (G6), and wherein the fourth gear gearset (G4) is positioned on a side of the layshaft (15) farthest from the engine, the sixth gear gearset (G6) is positioned on a side of the layshaft (15) closest to the engine, the second gear gearset (G2) is positioned in between the fourth and sixth gear gearsets (G4, G6),  
15 an interlocking mechanism (38) common to the second gear gearset (G2) and the fourth gear gearset (G4) is positioned between the second gear gearset (G2) and the fourth gear gearset (G4), and a specialized interlocking mechanism (37) for the sixth gear gearset (G6) is positioned between the second gear gearset (G2) and the sixth gear gearset (G6).

20 13. The twin-clutch manual gearbox as claimed in Claim 12, wherein the sixth gear gearset (G6) comprises, in a mutually interlocking manner, a sixth gear input gear (30) which is formed as one unit onto an outer diameter of the second input shaft (6), and a sixth gear output gear (31) which is rotatably provided on the  
25 layshaft (15), the second gear gearset (G2) comprises, in a mutually interlocking manner, a second gear input gear (32) which is formed as one unit onto the outer diameter of the second input shaft (6), and a second gear output gear (33) which is rotatably provided on the layshaft (15), and the fourth gear gearset (G4)

comprises, in a mutually interlocking manner, a fourth gear input gear (34) which is formed as a single unit onto the outer diameter of the second input shaft (6) and a fourth gear output gear (35) which is rotatably provided on the layshaft (15).

5 14. The twin-clutch manual gearbox as claimed in any one of Claims 1 to 13, wherein the layshaft (15) has a maximum diameter approximately at a midway point.

10 15. The twin-clutch manual gearbox as claimed in Claim 14, wherein the midway point is at a position equivalent to a boundary between the second gearsets (G2, G4, G6) and the first gearsets (G1, G3, G5).

16. A vehicle having an engine fitted with a twin-clutch manual gearbox as claimed in any one of claims 1 to 15.